

Current Situation and Countermeasures of Alumina Industry in China



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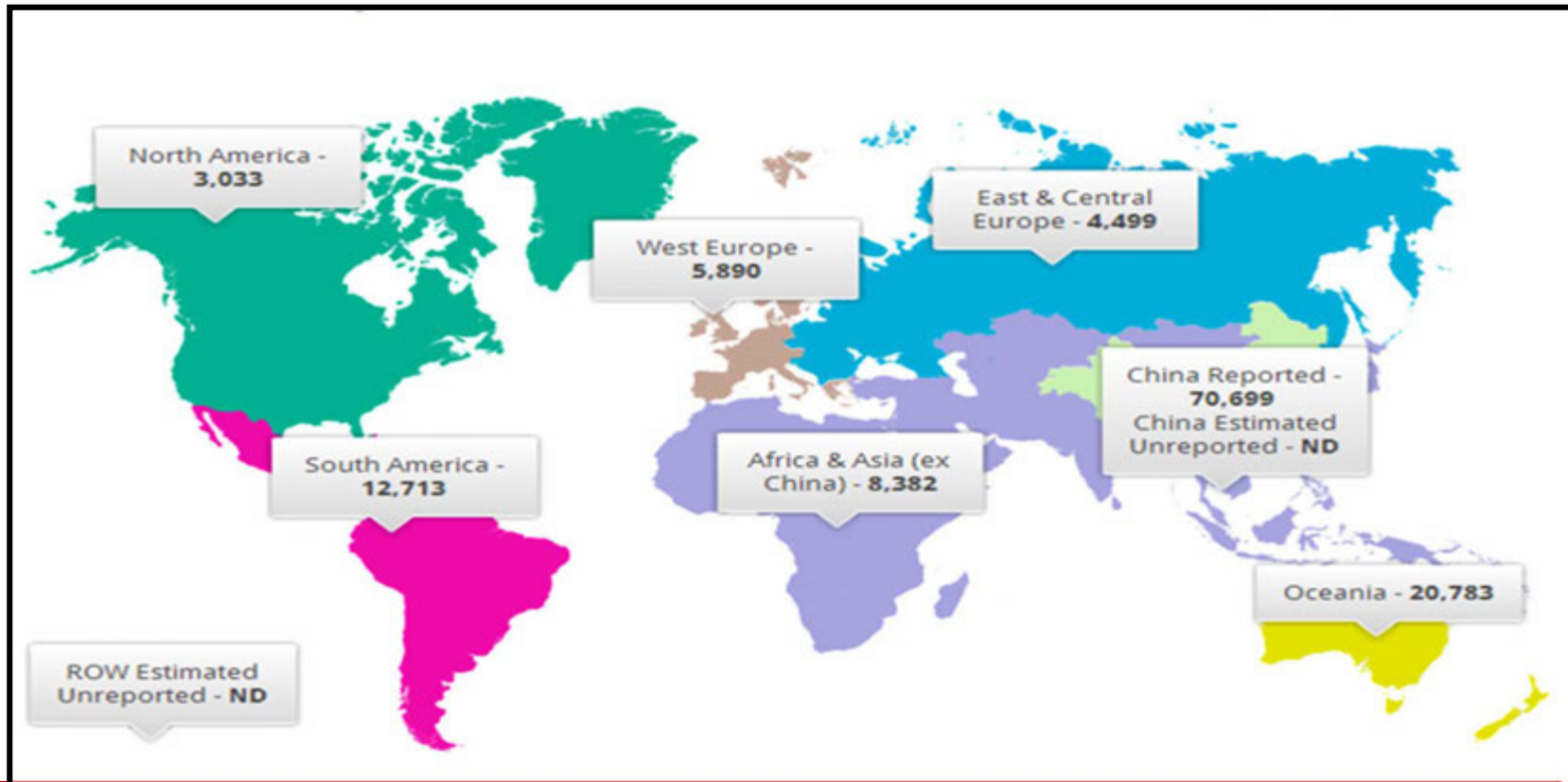
Contents

- Current Situation of Chinese Alumina Industry**
- The Challenges Chinese Alumina Industry Facing**
- Countermeasures for Chinese Alumina Industry**



Alumina Production and Bauxite Resource

Global Alumina Production in Year 2017(k tons)

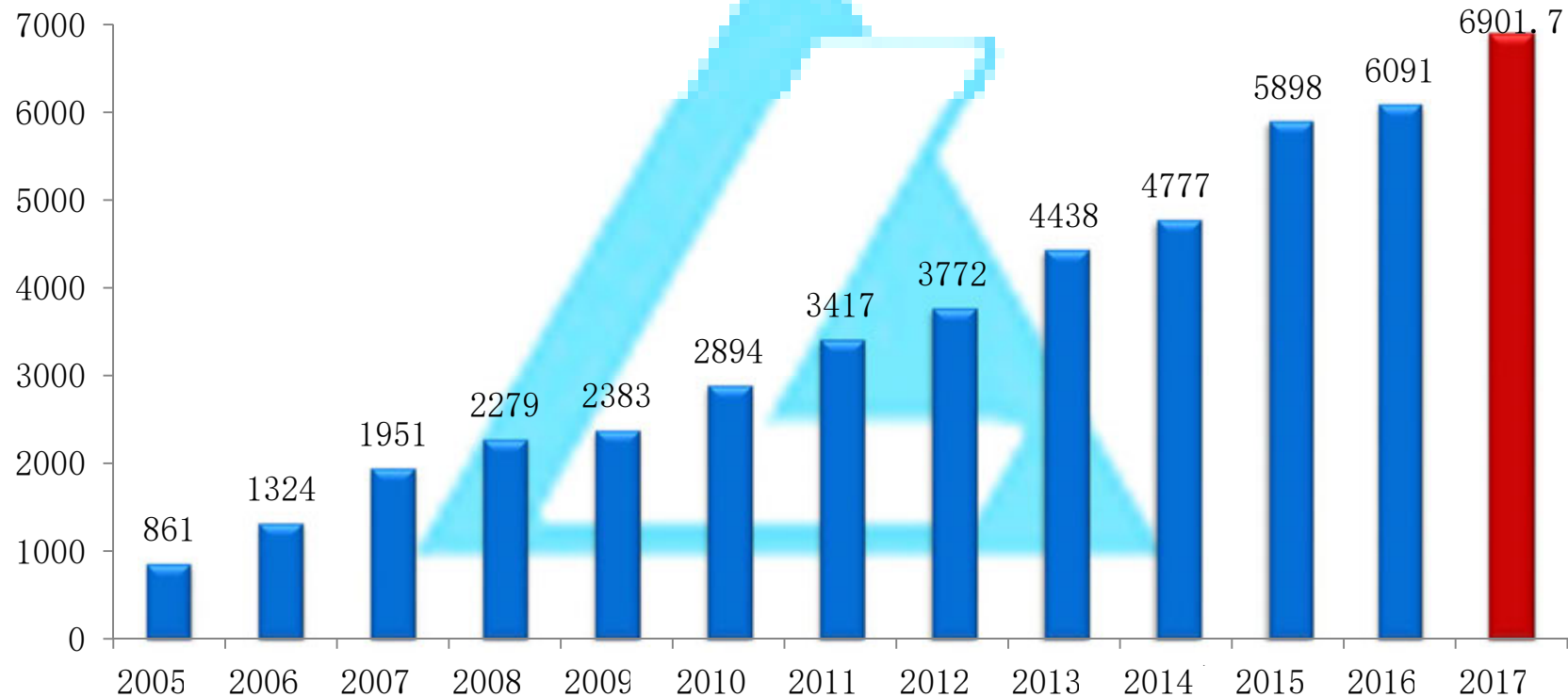


Chinese alumina production was **56.1%** of the whole world last year.



Alumina Production and Bauxite Resource

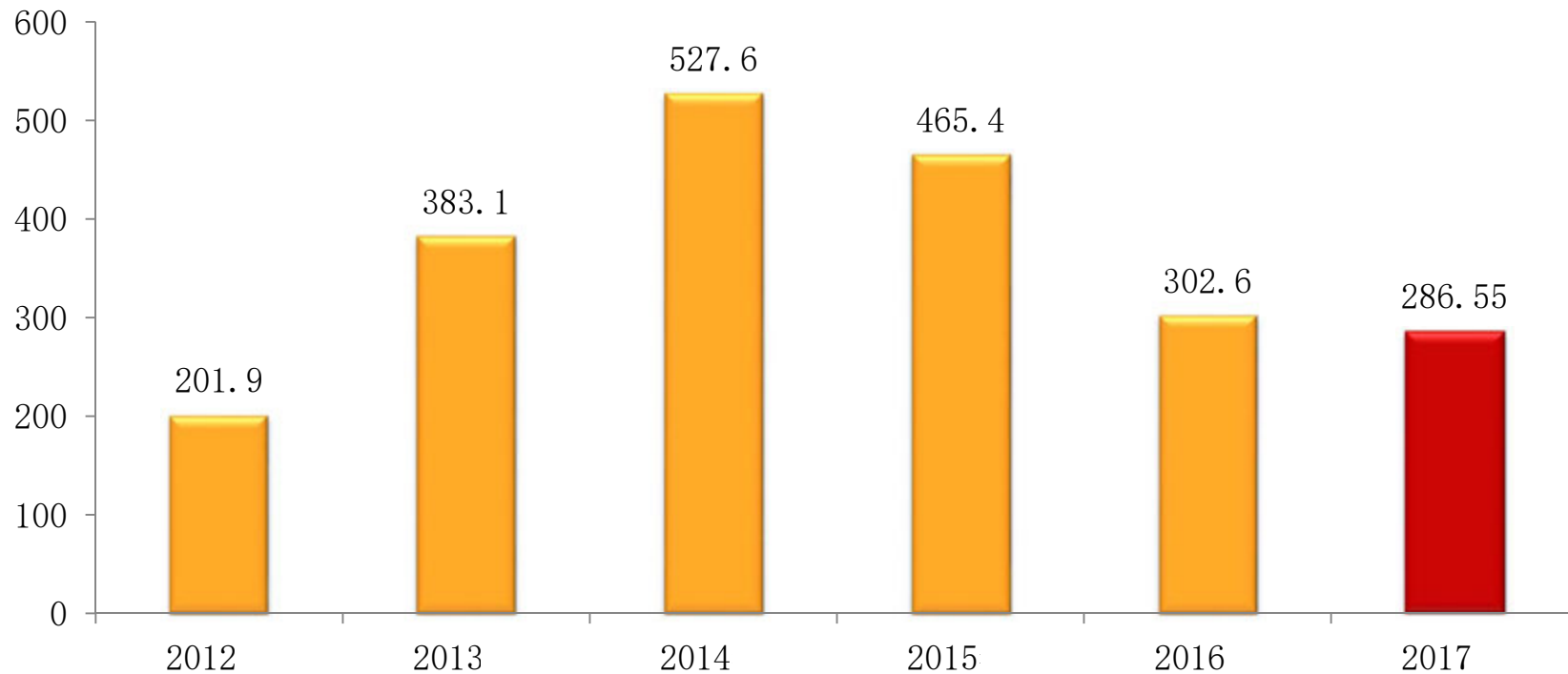
● Chinese Alumina Production in the past 13 years (10k tons)





Alumina Production and Bauxite Resource

● Imported Alumina in China(10k tons)

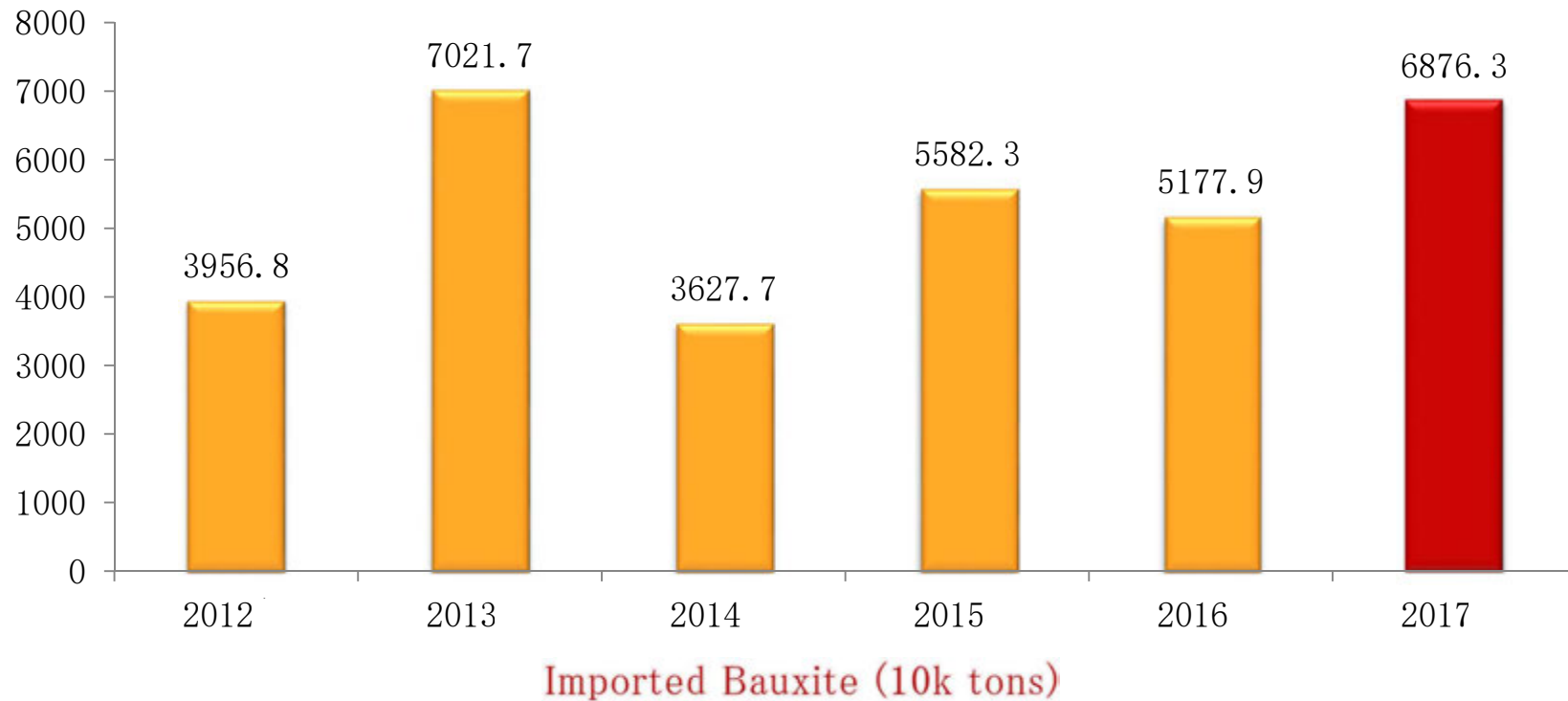


In recent years, China's import of alumina has shown a downward trend, with 2,865,500 tons of alumina imported in 2017



Alumina Production and Bauxite Resource

● Chinese Imported Bauxite

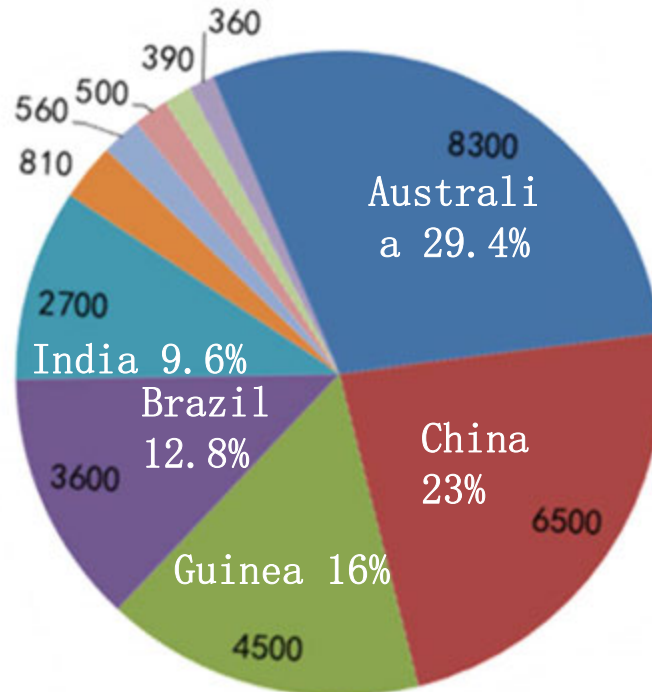


The total of imported bauxite in 2017 is over 68 million tons, which is almost 51% of the yearly bauxite consumption in China .



Alumina Production and Bauxite Resource

● Global Bauxite Production in Year 2017

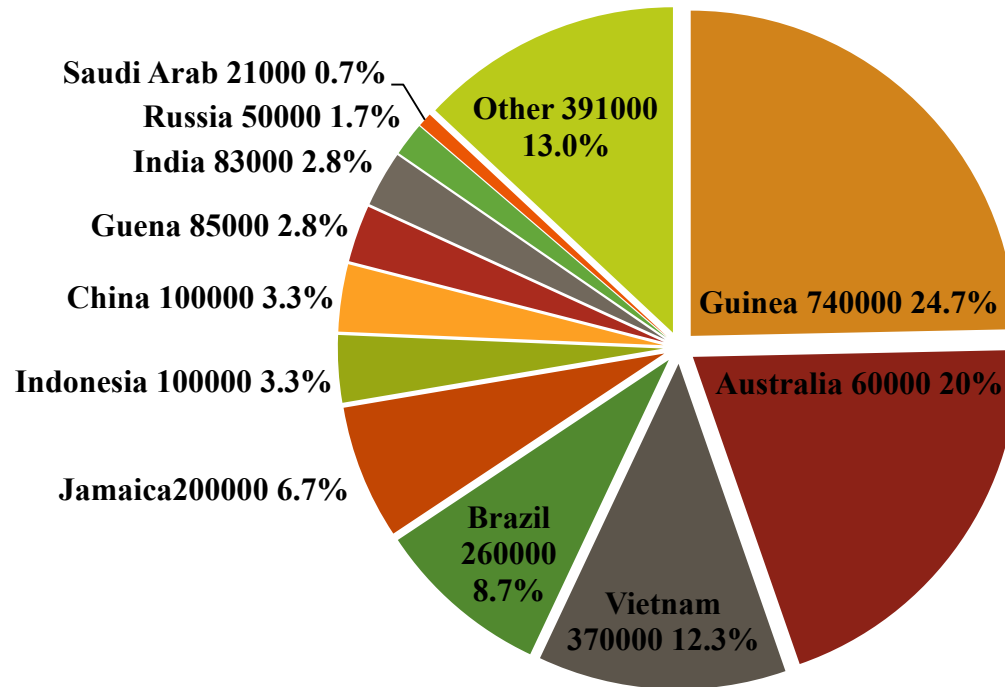


The output of global bauxite in 2017 was about 282 million ,among which China ranked the second with more than 23% of the total , with 65 million tons.



Alumina Production and Bauxite Resource

● Global Bauxite Resources Reserve (10k tons)



Total global bauxite resource reserve is 30 billion tons in 2017, among which China only accounts for 3.3%, with 1 billion tons.



Contents

- Global Bauxite Resource and Alumina Production**
- The Challenges Chinese Alumina Industry Facing**
- Countermeasures Needed for Chinese Alumina Industry**



Resource Issue

- **Bauxite Quantity— severe shortage**
- **Over half of the whole world's alumina production with only 3.3% of the global bauxite reserve**
- **Almost half of the bauxite used from abroad**



Resource Issues

- **Bauxite Quality —Sharply Deteriorating**





Resource Issues

- **Bauxite Quality —Sharply Deteriorating**
- ✓ **More Species of Impurity and Their Content Higher**

	Si	K	Li	C _{org}	S
More Difficult Operation				✓	
More Soda Consumption	✓				✓
Higher than Standard		✓	✓		
Less Whiteness				✓	✓
Finer Particles				✓	
Lower Yield				✓	
Corrosion Safety					✓



Environmental Issue

- **Air pollution- more severe regulations**
 - ✓ **Removal of sulfur oxide in fume**
 - ✓ **Removal of nitric oxide in fume**
 - ✓ **Removal of suspension particles in fume**

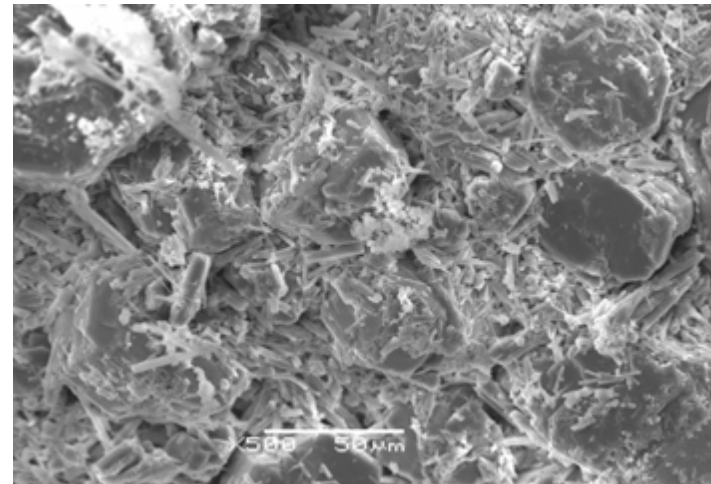
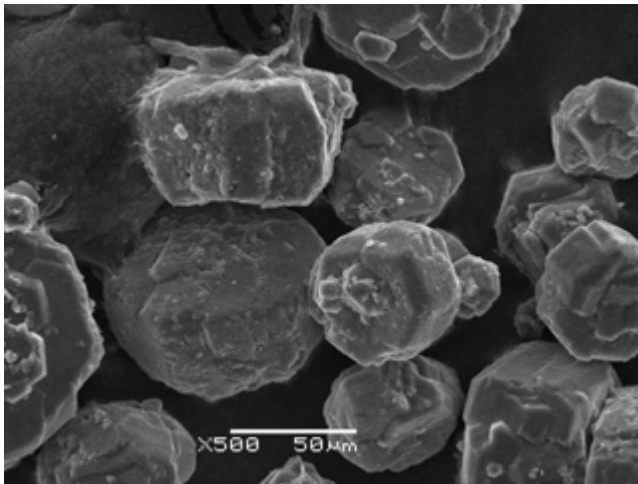
	Previous Standard mg/Nm³	Present Standard mg/Nm³
Sulfur Oxide	200-400	100
Nitric Oxide	None	100
Suspension Particles	20-100	10





Commodity Quality Issues

- **Physical Property**
- ✓ **Particle Size Finer**
- ✓ **Particle Fragile**





Commodity Quality Issues

● Chemical property deterioration

- ✓ Lithium higher
- ✓ Sodium higher
- ✓ Potassium higher
- ✓ Ferrous higher
- ✓ Zinc higher
- ✓ Gallium higher

	1	2	3	4	5
Li ₂ O	0.13	0.12	0.017	0.067	0.020
Na ₂ O	0.30	0.49	0.37	0.32	0.37
K ₂ O	0.031	0.037	0.014	0.021	0.086
Fe ₂ O ₃	0.017	0.013	0.0053	0.019	0.010
ZnO	0.0048	0.0045	0.018	0.0023	0.0036
Ga ₂ O ₃	0.014	0.013	0.014	0.012	0.021



Economic Issues

- **Higher Manufacturing Cost**
 - ✓ **More consumption included bauxite, soda, and energy**
 - ✓ **More expense of environmental protection**
 - ✓ **More labor cost**





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- Global Bauxite Resource and Alumina Production**
- The Challenges Chinese Alumina Industry Has**
- Countermeasures for Chinese Alumina Industry**



Countermeasures

- Shortage of bauxite resource
- ✓ Bauxite Import
 - **Process Modified Needed**
 - **Bauxite source unsteady**
 - **Price Increase**





Countermeasures

- Shortage of bauxite resource

- ✓ The application of low grade bauxite

- How to remove the silica from the bauxite to increase its grade

—Physical Flotation





Countermeasures

- Shortage of bauxite resource
- ✓ The application of low grade bauxite
- How to remove the silica from the bauxite to increase its grade

—Chemical Flotation

Bauxite/%			Concentrate/%		
A/S	S	Corg	A/S	S	Corg
2.99	1.71	0.3	8-9	0.2-0.4	None



Countermeasures

□ Shortage of bauxite resource

✓ The Substitute of bauxite

- Fly ash

 - Soda Process

 - Acid Process

- Nepheline

- Andalusite



Countermeasures

- Lower quality of alumina

- ✓ To remove sulfur

- Calcination (being industrialized)

- Physical Flotation (industrialized)





Countermeasures

- Lower quality of alumina

- ✓ To remove organic

- Wet Oxidation to remove non-oxalate organics
(being industrialized)

- Crystallization to remove oxalate during seeded precipitation
(industrialized)

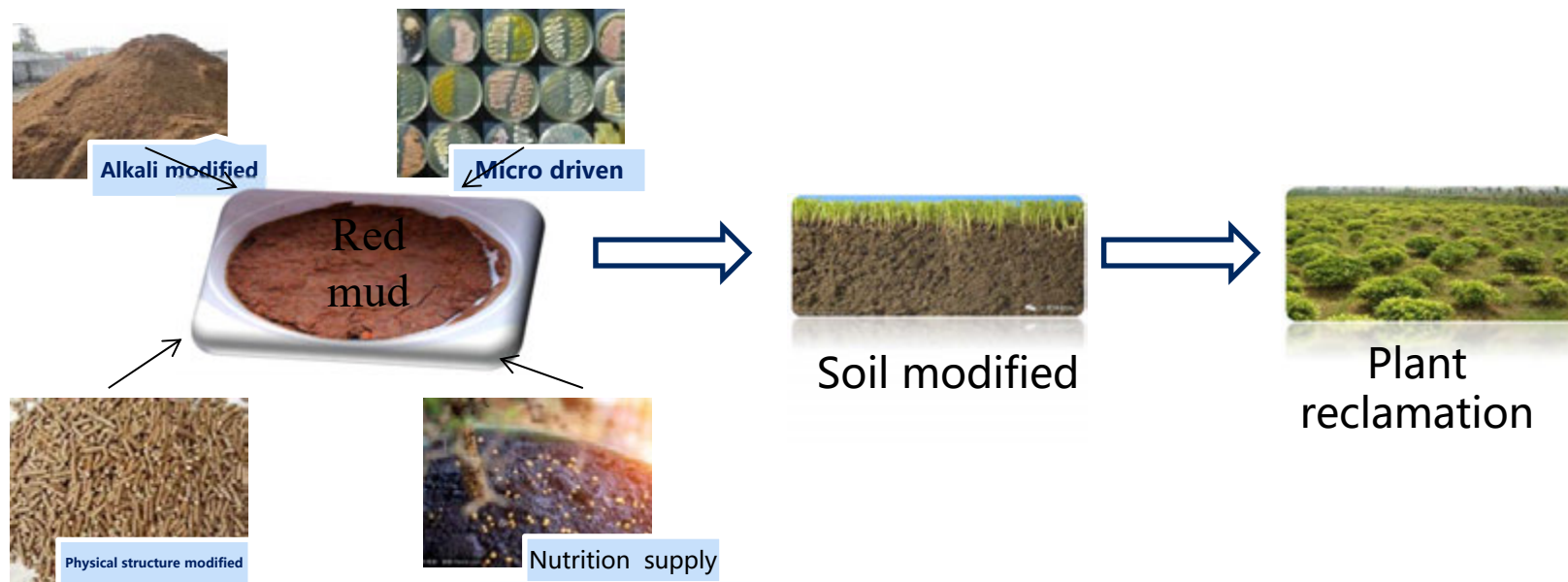




Countermeasures

● Environmental Issues

- ✓ Bauxite residue
- Dry stack industrialized
- Comprehensive application being researched
- Reclamation of bauxite residue dam being researched





Countermeasures

- Higher manufacturing cost
- ✓ Realization of online analysis
- ✓ Application of AI





Thanks for your attention!